METHOD FOR ADJUSTING CURRENT DISTRIBUTION FOR ELECTROPLATING

Ref. 1

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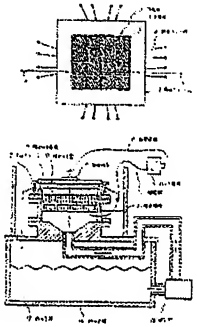
Abstract of **JP2200800**

PURPOSE:To easily adjust a current distribution by each of sub-segmented plating areas by combining small anodes which can be individually set at desired current values to form a assembled anode, disposing such anode to face a surface to be plated and properly adjusting the currents of the individual small anodes. CONSTITUTION:For example, 16 pieces of the small anodes 1 which can be set individually at the desired current values are combined to a net shape to form the assembled anode 5 and this anode is so installed as to face the surface 10 to be plated of a substrate 11 to be plated. A plating liquid 13 of a plating cell 14 is fed by a pump 15 to the assembled anode 5 and is brought into contact with the surface 10 to be plated through the assembled anode 5; thereafter, the liquid is returned to the plating cell 14. The currents flowing out of the small anodes 1 are insulated by an anode frame 2 and are, therefore, kept at the set values when the currents are supplied to the small anodes 1, which are respectively properly set, of the assembled anode 5 from a power source 6 in this constitution. The current distribution well reflecting the individual current set values is obtd. when the currents emit from the assembled anode 5. Desired plating patterns are formed on the surface 10 to be plated in this way.



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審査請求　未請求　請求項の数 1　(全4頁)

㊹発明の名称　電気めっきの電流分布調節方法

㉑特　願　平1−20619
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明　細　書

1．発明の名称

電気めっきの電流分布調節方法

2．特許請求の範囲

(1) 個々に所望の電流値設定可能な小陽極を少なくとも2つ以上組み合せ組織した複合陽極を、被めっき面に対向して配置し、かつ個々の小陽極の電流を適性に調節することによって、被めっきエリアのめっき電流分布を調整することを特徴とする電気めっきの電流分布調節方法。

3．発明の詳細な説明

〔産業上の利用分野〕

本発明は、電気めっきにおけるめっき膜厚分布均一化のためのめっき電流分布調節に関するもので、特に微細パターン選択電気めっき工法における、複数の個別に電流値設定可能な小陽極の組織体を用いて行うめっき電流分布調節方法に関する。

〔従来の技術〕

従来、電気めっきにおけるめっき膜厚分布の均一化は、一般に電流が集中する(即ちめっき膜の厚くなる)めっきエリア周囲部分に、電流集中を緩和する補助陰極や遮蔽板を設ける方法によって行われていた。そして高度に均一なめっき膜厚を必要とするLSI搭載用等の高密度配線基板を、選択電気めっき工法により製造する場合においても、めっきのエリアの周囲部分と中央部分のめっき膜厚差の改善を主目的とした、めっきエリア全体を巨視的に捉えた電流分布調節方法が行われていた。

〔発明が解決しようとする課題〕

上述した従来の電流分布調節方法は、めっきエリア全体について巨視的に捉え電流分布を調節しようとしているので、年々微細高密度化しさらに大型化するLSI搭載用等の高密度配線基板を、選択電気めっき法により製造する場合においては、めっきエリア内の配線パターンの濃淡(即ちめっきエリアを小面積に区切って見た場合に、各製品毎に固有の、設計ルールが許す最大限度いっぱいまで高密度に配線が有る部分や、反対にほとんど配線の無い部分等があること)によって発生する、

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(Reference 1)

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METHOD OF ADJUSTING CURRENT DISTRIBUTION IN ELECTROPLATING

(21) Application No. 1-20619

(22) Application Date: January 30, 1989

(71) Applicant: NEC Corporation

2. Claim

(1) A method of adjusting a current distribution of electroplating characterized in :

arranging a composite anode opposed to the surface of a plating object, the composite anode including at least two small anodes, and a desired current value being settable for each of the small anodes, and

adjusting an electric current in each of the small anodes to a have proper value, and thus adjusting a plating current distribution in a plating area.

[Means for Solving the Problems]

To achieve the above-described object, the method of adjusting a current distribution in electroplating of the present invention is characterized in that :

arranging a composite anode opposed to the surface of a plating object, the composite anode including at least two small anodes, and a desired current value being settable for each of the small anodes, and

adjusting an electric current in each of the small anodes to a have proper value, and thus adjusting a plating current distribution in a plating area.

[Preferred Embodiments]

Hereinafter, the present invention will be described with reference to the

drawings.

Fig. 1 is a front view of a composite anode used in a method of adjusting an electroplating current distribution in electroplating according to an embodiment of the present invention. In this embodiment, the composite anode includes sixteen small anodes, and has a quadrangular shape. It is apparent that the scope of the present invention is not restricted to the above-described composite anode. In the drawing, reference numeral 3 denotes an anode frame, and 4 denotes an anode lead wire.

Fig. 2 is a longitudinal cross-sectional view of the composite anode shown in Fig. 1. Each small anode 1 is an anode sheet having a net shape, e.g., formed of a platinum plated titanium mesh or the like. An anode rim 2 is formed of, e.g., a heat resistant vinyl chloride or the like, and has 16-divided sections with no lids and bottoms. The small anodes 1 are secured to the anode rims 2, and are electrically insulated from each other. The anode frame 3 is a support for attaching the anode rims 2 to a plating vessel or the like. Anode lead wires 4 are, e.g., platinum plated titanium wires coated with a resin, and are connected to the small anodes 1, respectively. The anode lead wires pass through the anode frame 3 to be led out to the outside.

Fig. 3 is a longitudinal cross-sectional view illustrating the action of the composite anode according to an example of an electroplating device adopting the method of adjusting a current distribution of the present invention. A composite anode 5 is an anode according to the present invention described with reference to Fig. 1 and Fig. 2. A plating power supply 6 is a plating current supply having channels in the number equal to that of small anodes 1. Plus (+) electric supply lines 7 are lead wires connecting the respective channels on the plus side of the plating power supply 6 to the anode lead wires 4 led out from the respective small anodes 1. It is to be noted that one + electric supply line 7 is shown with the other electric power supply lines being omitted in Fig. 3 for

simplicity. A minus (-) electric supply line 8 is a lead wire collectively connecting the minus (-) side of the plating power supply 6 to the side of a sheet as a plating object. A cathode terminal 9 is a terminal provided for achieving sufficient electrical contact with a sheet 11 as a plating object. A plating surface 10 is a portion to be plated by the method of adjusting a current distribution of the present invention. The sheet 11 as a plating object is a part having the plating surface 10. The plating will be described more in detail with reference to Fig. 4 and Fig. 5. A holder 12 is a tool for holding the plating sheet 11 in a proper position with respect to the composite anode 5. A plating liquid 13 is an electrolyte for depositing to form a predetermined plating film on the plating surface 10. A plating vessel 14 is the main part of an electroplating apparatus comprising a service tank, a plating liquid circulation pipe, and a plating chamber. A pump 15 is provided for circulating the plating liquid.

The operation will be described below. First, a circulation route for the a plating liquid will be described. A plating liquid 13 is caused to flow with the pump 15 in the circulation pipe in the direction shown by the arrow to reach the composite anode 5. The small anodes 1 assembled in the composite anode 5 have a net shape. Therefore, the plating liquid 13 passes through the composite anode 5 while contacting with the small anodes 1, and further rises to contact with the plating surface 10. The plating liquid 13, after reaching the plating surface 10, overflows through the space between the plating sheet 11 and the holder 12, and is returned to the service tank disposed below the space.

Hereinafter, the flow of plating current will be described. Electric current fed from the plating power supply 6 to the respective small anodes 1 through the plus (+) electric supply line 7, is further fed to the plating surface 10 through the plating liquid 13. Then, the electric current is collected to the cathode terminal 9, and is returned to the plating power supply 6 through a minus (-) electric power supply bus 8.

Hereinafter, the method of adjusting a current distribution will be described. Substantially all of the electric currents having properly-set characteristics, respectively, are supplied to the small anodes 1, begin to flow toward the plating surface 10. The electric current flowing toward the pump 15 side is negligible. While the electric currents flowing out from the small anodes 1 flow forward inside the composite anode 5, they are insulated from each other by the anode rims 2, and thus they are maintained at the set values. The electric currents flowing out from the composite anode 5 are not sectioned by the anode rims 2, and thus are mixed with each other. Thus, the current distribution is determined by the shape-size of a space defined by the plating surface 10, the composite anode 5, and the holder 12. However, the obtained current distribution is sufficiently reflecting on the current set values of the respective small anodes 1, which current distribution is different from the current distribution obtained by a single anode. Accordingly, in the method of adjusting a current distribution of the present invention, the distance between the upper surface of the composite anode 5 and the plating surface 10 has a very important meaning. In this example, great current adjustment advantages can be obtained, if the distance is up to 100 mm.